

hardly be admitted; the persistence over large areas of the different palaeontological zones of this formation shows that the Liassic sea formed one great life province, and that however it may have been broken up by projecting headlands or insular masses of land, there was free communication between all its parts. That the water was shallower in some places than others is likely enough, and variations in depth would seem to be sufficient to account for the changes which occur in the lithological character of the Lias in North Yorkshire without invoking the neighbourhood of an extensive shore line. A very interesting fact is the decided unconformity between the Lias and the Inferior Oolite east of Easingwold; the upheaval to which it is due was only the forerunner of the still more important movements which a little later on drove back the sea and established estuarine and terrestrial conditions over a large part of the North Riding.

It is not necessary that a scientific work should be a model in point of style, but it is a matter for regret when scientific writers neglect the graces of composition, and it is certainly a blot on the work before us that the writing is occasionally obscure, and that instances of somewhat slipshod English are not uncommon in it.

If we stop here it is not for want of more to say; a book as rich in matter as this would furnish texts for many another lengthy disquisition. We may fairly congratulate the authors on having produced a monograph which will take a high place among standard works on local geology, and may be recommended as a model for writings of a similar kind. We wish every natural geological district in our island was likely to be worked out with the same amount of patient labour and faithful description as Messrs. Tate and Blake have bestowed on the Yorkshire Lias.

A. H. G.

## OUR BOOK SHELF

*Die Fauna der Clavulina Szabói Schichten.* Von Max. von Hantken. I. Theil: Foraminiferen. Mit 16 Tafeln. (Buda-Pesth, 1875.)

EVERY visitor to the Loan Exhibition of Scientific Apparatus at South Kensington must have noticed in the Geological Department some beautiful series of preparations of Foraminifera and Bryozoa from Hungary. These have been sent by Dr. von Hantken, the Director of the Hungarian Geological Survey, who has greatly distinguished himself by the remarkable skill with which he has studied these minute fossil organisms. One of these series of fossils, which English geologists have now such a valuable opportunity of studying, illustrates the remarkably rich Foraminiferal fauna of the zone of Clavulina Szabói in Eastern Europe, a fauna which is very admirably described in the work before us. This memoir is a reprint of a portion of the fourth volume of the "Mittheilungen aus dem Jahrbüche der kön. ungar. geologischen Anstalt," which is published in both the Hungarian and German languages.

The Clavulina Szabói Schichten are a series of clays, marls, and marly limestones, sometimes glauconitic, which are situated at the junction of the Eocene and Oligocene formations, and appear to have a wide distribution in Western Hungary. These strata are very remarkable for the wonderful richness of their fauna, especially in Foraminifera, Bryozoa, Echinoderms, and Mollusca, while in certain portions of the formation great numbers of fish-remains have also been found. No less than 213 species of Foraminifera have been described by Dr. von Hantken as occurring in these beds, and their distribution in the Eocene and Neogene strata of Eastern Europe, as

well as in the strata which most nearly correspond in geological age with the zone of Clavulina Szabói in Germany and Italy respectively, are shown by the author in a very useful table. The lithographic plates with which this monograph is illustrated are beautifully executed, and reflect the highest credit on the present condition of the art of book-illustration in Hungary. Although the dimensions of each of the forms described is given with great exactness in the definition of the species, we think it is unfortunate that the extent to which each figure is magnified is not also indicated either on the plates themselves or in the descriptions which accompany them.

J. W. J.

*Elements of Algebra for Middle-Class Schools and Training Colleges.* By Edward Atkins, B.Sc. (Collins's School Series, 1876.)

THIS is a handy book, covering the ground usually occupied by similar treatises on the subject. It is a fairly independent work, keeping near the beaten track as regards results arrived at, but giving these results in many cases by new modes of proof. The chief additional features of interest are in some articles on "Imaginary Quantities," "Properties of Numbers," and "Determinants." We do not like the use of the expression, "It is easily found," and so on, in a few passages, and we must point out that there are a great many mistakes, not merely typographical ones. These are faults which can easily be rectified in a second edition. Care also should be taken to correct the numerous wrong references.

## LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

Carl Jelinek

ALLOW me to correct a little inadvertency in the necrology of Carl Jelinek (NATURE, vol. xv. p. 85). In line 8 from commencement "Prague" should be read instead of "Vienna," as the former and not the latter observatory was then under the direction of Kreil. Jelinek passed four years (1843-1847) as assistant in the Vienna observatory, then under my direction, and published in that period a valuable memoir on hygrometrical observations made at Vienna in the years 1829-1845, besides several astronomical observations and computations in the *Astronomische Nachrichten*, and in the *Annals* of the Vienna observatory.

CH. DE LITTRROW

Vienna, November 29

## Ancient Solar Eclipses

IN NATURE, vol. xv. p. 65, is given the result of calculation of the solar eclipse of June 14, B.C. 763.

As soon as notice of the probability of this eclipse was given by Sir Henry Rawlinson (in May 1867), I asked the assistance of Mr. Hind for its computation. Mr. Hind most kindly acceded at once to my request, and sent to me on June 19, 1867, the following results, which he permits me now to offer to NATURE. They were transmitted to Sir Henry Rawlinson on June 20, 1867, and to Mr. George Smith on October 17, 1867.

## SOLAR ECLIPSE, -762, JUNE 14-15.

Path of Totality, according to the Lunar Tables of Hansen and the Solar Tables of Le Verrier.

Greenwich Mean Solar Time, B.C. 763.	Northern Limit.		Central Line.		Southern Limit.	
	Long.	Lat.	Long.	Lat.	Long.	Lat.
June 14, 18 54	35° 23'	37° 52'	36° 3'	37° 7'	36° 44'	36° 20'
19 0	38° 29'	38° 53'	39° 6'	38° 4'	39° 43'	37° 14'
19 6	41° 33'	39° 45'	42° 7'	38° 54'	42° 39'	38° 3'
19 12	44 35'	40° 31'	45° 4'	39° 38'	45° 32'	38° 46'
19 18	47 34'	41° 9'	47 59'	40° 14'	48° 23'	39° 21'
19 24	50° 32'	41° 40'	50° 52'	40° 45'	51° 12'	39 49

The path of the shadow defined by these numbers differs sensibly from that given in NATURE, vol. xv. p. 65. It passes to the north of Nimrud instead of the south.

With the permission of Mr. Hind, I also transmit the following list of solar eclipses, computed by him, of which the results are preserved in the manuscripts of the Royal Observatory :—

- 885, July 24	... - 533, Aug. 31	... A.D. 671, Dec. 6
- 884, July 13	... - 480, April 18	... 647, Oct. 12
- 769, May 4 <sup>5</sup>	... - 479, Oct. 1-2	... 840, May 5
- 762, June 14	... - 477, Feb. 16-17	1133, Aug. 1
(above)	... - 309, Aug. 14	1140, March 20
- 688, Jan. 10	... - 189, March 13	1173, June 11
- 609, Sept. 29	... - 187, July 16	1241, Oct. 6
- 602, May 17	... - 103, July 18	1433, June 17
- 584, May 28	... - 50, March 6	1521, April 6-7
- 556, May 19	... A.D. 29, Nov. 23	1567, April 8
- 548, June 18	... 113, May 31	1598, March 6
- 546, Oct. 22	... 237, April 12	1652, April 7
- 534, March 17	... 418, July 18	

G. E. AIRY

Royal Observatory, Greenwich, December 5

#### Negretti's Reversible Thermometer and the Arctic Expedition

CAPT. NARES presents his compliments to the editor of NATURE, and requests him to correct a mistake which Capt. Nares inadvertently made in his official report to the Admiralty concerning the late Arctic expedition, and which has been reprinted in NATURE.

In obtaining some deep-sea temperatures, which proved the existence of a sub-stratum of water warmer than that at the surface, the instruments used were the reversible thermometers of Negretti and Zambra, not Casella's. The Casella thermometer was used on other occasions, but not at the time referred to.

H.M.S. *Alert*, Portsmouth, November 30

#### The Arctic Expedition

Two or three considerations have led me to believe that possibly the recent Arctic Expedition has not been so fortunate as might have been wished, and that the same amount of foresight, courage, and energy, expended on a similar expedition another year might be attended with much more satisfactory results.

The considerations referred to are these :—

Fifty years ago Sir Edward Parry traversed a distance of some hundreds of miles in sledges upon what he at first supposed to be the main pack ; but on finding that as fast as he travelled northwards he was drifting to the south, he concluded what he had mistaken for the main pack, was after all only a loose floe of immense extent.

Now in 1872, on the return of the American expedition, we were all given to understand that an open Polar Sea existed where instead is now found a sea of ancient ice. All testimony concurred in pointing to this open sea. The climate was warmer than further south ; birds were seen flying north ; a creeping herbage flourished, and bright flowers were not absent. Musk oxen, rabbits, and lemmings also abounded. Now these *Polaris* explorers were neither mendacious nor stupid ; and it seems to me that it is rather premature to set down their inference from all they observed as a mistake.

Now, sir, my theory, true or false, new or old, is this :—This Paleocrytic Sea is really a vast floating island of ice ; say 500 miles in diameter. Just like the ice in a pail or on a pond, it melts in the hot weather at the edges, and then, disengaged from the land, it floats hither or thither, according to the direction of the prevalent winds or currents. If this theory be correct, it accounts for Parry's disappointing journey, for the inferences based on the *Polaris* observations, and for the otherwise unaccountable fact that the ice encountered by the recent explorers is undoubtedly ancient. The fact that the vast floe showed no signs of drifting away last summer only shows that the wind was unfavourable, or that this northernmost Greenland coast, when once the ice is stranded, does not easily relinquish its grasp. Possibly if a *Hecla* had attempted in 1876 what was impracticable in 1827, or if an *Alert* had tried in 1827 what has just proved a failure, both enterprises would have succeeded.

Next time two opposite routes must be undertaken simultaneously, of which one will fail and the other succeed.

WORDSWORTH DONNISTHORPE  
17, Porchester Terrace, W.

#### The Age of the Rocks of Charnwood Forest

IN reference to the letters which have appeared in NATURE (vol. xv. p. 97) allow me to say, in the first place, that I neither attached, nor intended to attach, any discredit to Mr. Woodward's very useful manual for the statements it contains in reference to the age of the Charnwood Forest Rocks. On the other hand, I am gratified to find that so competent an observer as the Rev. T. G. Bonney concurs with me in the view "that there is not a particle of evidence for their Laurentian age." This was the special point of my letter ; and I fail to see that Prof. Green's hypothetical inferences from certain sections at Markfield (of which he fears that he has kept no record) are of much value in the question. Prof. Green, however, admits that the great mass of these rocks give no evidence of Laurentian age.

As regards what may be the respective limits of "Cambrian" and "Silurian" rocks that is another question. I am quite aware that Sedgwick claimed formations as "Cambrian" which are not so recognised by the Geological Survey, nor by the majority of authors, continental as well as British ; for example, M. Barrande. To which of the series of formations belonging to the Cambrian system of Sedgwick the forest rocks are to be referred I am not prepared to say ; but I think it must be allowed that the negative evidence founded on the absence of fossils ought to have some weight in favour of the view that they are referable to the horizon of the "Cambrians" of the Geological Survey rather than to that of the Llandeilo or Caradoc beds.

Mr. Bonney's comparison of the forest rocks with those of the volcanic series of the Lake District is very suggestive ; nor is the correspondence of the strike of the beds in both districts without its weight, where every circumstance ought to be taken into consideration in question of such uncertainty. It would also be very desirable if some general understanding could be arrived at regarding the respective limits of the Cambrian and Silurian systems. There are scarcely two authors who adopt the same view on this subject. Theoretically it may be a matter of small consequence ; but practically it gives rise to confusion amongst geologists and amongst students of geology. As this is the age of "conferences" why should not a conference of Palaeozoic geologists meet and lay down a frontier line for the two kingdoms, which would last, perhaps, for a generation, and until the "instinct of nationality" crops up and brings on another conflict between the inhabitants of Cambria and Siluria, and their allies respectively ?

EDWARD HULL  
Geological Survey Office, Dublin, December 4

#### "Towering" of Grouse, Partridges, &c.

MOST of your readers doubtless know what is meant by the towering of game-birds ; but, for the sake of those who do not, I will begin by describing the facts. When a partridge, for instance, is hit while on the wing by a few pellets of shot—perhaps only by one or two—the flight may continue for a variable distance ; but, if the bird is a "towerer," a slight irregularity soon begins to show itself, after which the flight rapidly becomes more and more laboured, till eventually the bird ceases its onward motion altogether. The direction of the flight now changes from the horizontal to the perpendicular, and with a rapid fluttering sort of action the bird rises to a variable height, when all motion suddenly ceases, the animal falls like a stone, and the sportsman then knows that when he finds his partridge it will be lying dead on the exact spot where he "marked it down."

Before proceeding to state the cause of these curious movements, I should like to draw more prominent attention to the facts, first, that the time after receiving the wound during which horizontal flight continues is variable ; second, that the limits of variation are tolerably definite, a bird never towering until it has flown some distance after being shot, and never flying any very great distance before towering ; and third, that the height to which the bird rises is also variable, this height being sometimes only 1 or 2 feet, and at other times 40 or 50.